THE NAVY & MARINE CORPS AVIATION SAFETY MAGAZINE

www.safetycenter.navy.mil • January - February 2010

Approach

AEROMEDICAL

The Navy & Marine Corps Aviation Safety Magazine

January-February 2010 Volume 55, No. 1

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Mishaps cost time and resources. They take our Sailors, Marines and civilian employees away from their units and workplaces and put them in hospitals, wheelchairs and coffins. Mishaps ruin equipment and weapons. They diminish our readiness. This magazine's goal is to help make sure that personnel can devote their time and energy to the mission. We believe there is only one way to do any task: the way that follows the rules and takes precautions against hazards. Combat is hazardous; the time to learn to do a job right is before combat starts.

Approach (ISSN 1094-0405) is published bimonthly by Commander, Naval Safety Center, and is an authorized publication for members of the Department of Defense. Contents are not necessarily the official views of, or endorsed by, the U.S. Government, the Department of Defense, or the U.S. Navy. Photos and artwork are representative and do not necessarily show the people or equipment discussed. We reserve the right to edit all manuscripts. Reference to commercial products does not imply Navy endorsement. Unless otherwise stated, material in this magazine may be reprinted without permission; please credit the magazine and author. *Approach* is available for sale by the Superintendent of Documents, P.O. Box 979050, St Louis, MO 63197-9000. Telephone credit card orders can be made 8 a.m. to 4 p.m. Eastern time at (866) 512-1800. Periodicals postage paid at Norfolk, Va., and additional mailing offices.

Postmaster: Send address changes to *Approach*, Code 71B,
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CON

Features

Focus on Aeromedicine

This issue has a variety of aeromedical articles to help aviators and aircrew stay mission ready. From discussions on flight-surgeon responsibilities, to lasers, and energy drinks, we want to raise awareness and provide information on topics relevant to the aviation community. Human factors is the lead causal factor in most mishaps and the focus of our mishap-prevention efforts.

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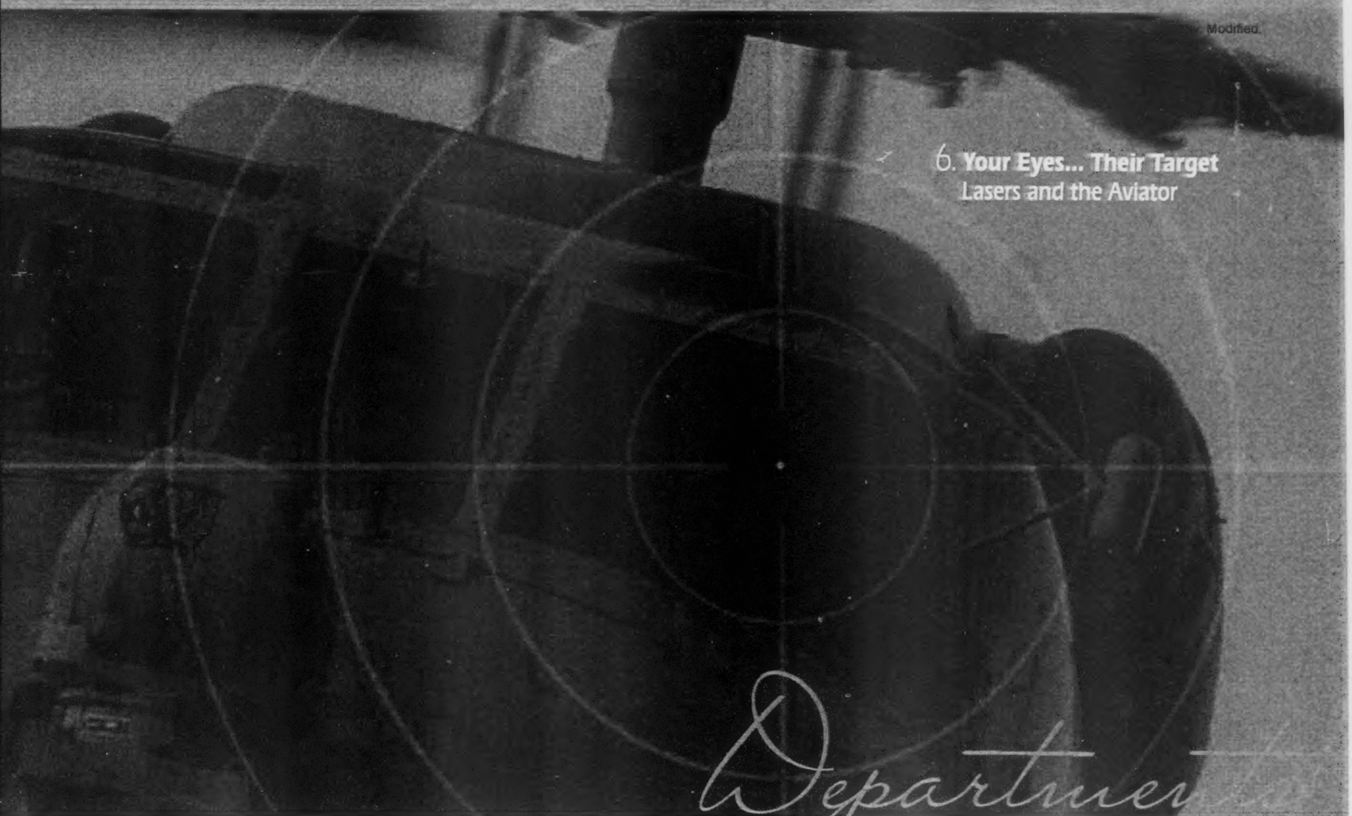

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The Initial Approach Fix

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Aviation Data
http://www.safetycenter.navy.mil/aviation/aviationdata/
Customer support
(757) 444-3520 Ext. 7860 (DSN 564)

Statistics
http://www.safetycenter.navy.mil/statistics/

Additional Resources

School of Aviation Safety
https://www.netc.navy.mil/nascweb/sas/

Command Safety Assessments
https://www.safetyclimatesurveys.org/
Dr. Bob Figlock, (831) 641-9700
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Naval Aviation Safety Programs (OPNAVINST 3750.6R)
http://www.safetycenter.navy.mil/instructions/aviation/opnav3750/

Let's Keep You Flying

By Capt. Nick Davenport, MC

"I'm not sick. I don't need a doctor!"

Well, you may be half-right. As a naval aviator, you're among the most capable, healthy, and stress-tolerant members of our society. You fly the best machinery in the inventory, at government expense, plus they're paying you to do it. You've received extensive flight training and mission experience, which puts you at the pointy end of aviation. Whether you fly fixed-wing aircraft or rotary-wing, you are a master of the sky. What a deal!

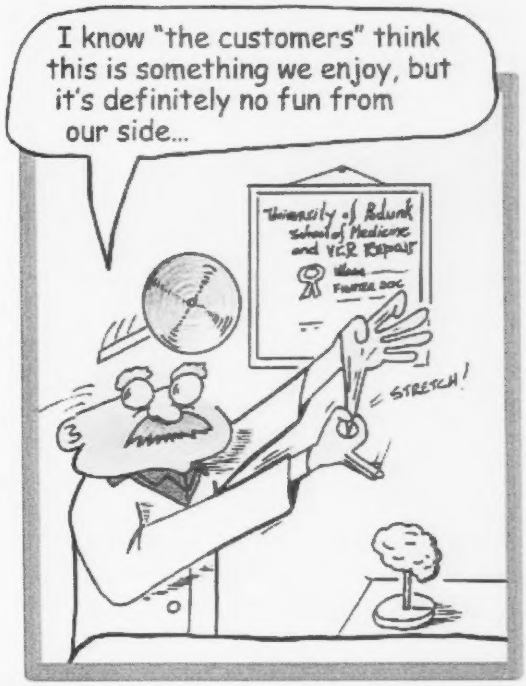
But somebody thinks you need a doctor, more specifically, a flight surgeon (FS). Plus, you also need aviation physiologists (APs), aviation-medicine technicians (AVTs), aeromedical safety officers (AMSOs), aviation optometrists, and aerospace- experimental psychologists (AEPs). You've got an entire specially-trained medical staff in aerospace medicine just to help you fly. Why? All that for an annual flight physical?

What if you are sick?

The pilot took the cat shot, and his Hornet climbed to 20,000 feet to join with his wingman and others in an air-intercept exercise. He wasn't feeling quite right once at altitude, and when his wingman called in, he replied, "I felt weird after the launch." He decided to hang out at 22,000 feet and let the others fight the exercise. He'd rejoin them on the way back.

On the rejoin, his wingman had difficulty understanding him—his transmissions were garbled and didn't make sense. Suspecting spatial disorientation, he tried to talk him back to the ship, only to watch him climb above 30,000 feet, then nose over and plummet into the ocean. The pilot and plane were lost at sea. The mishap investigation indicated he was flying without his mask, perhaps removed because he wasn't feeling well, and he probably had succumbed to hypoxia.

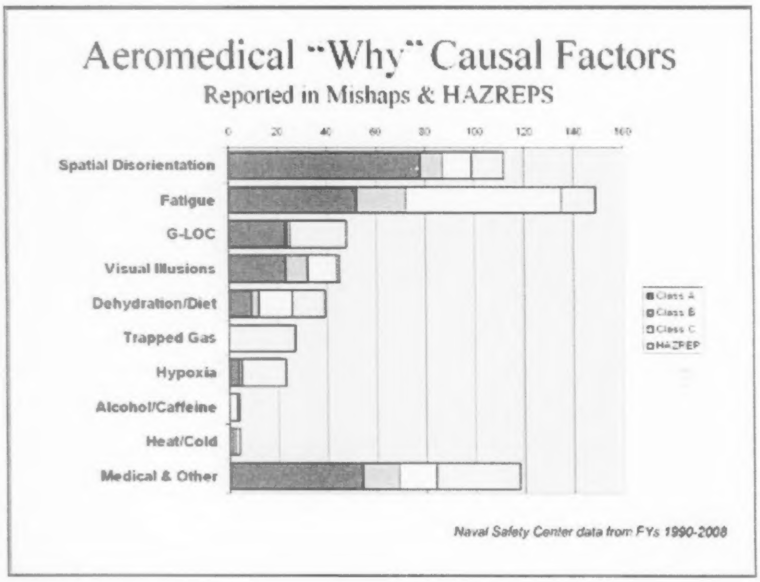
In another incident, an EA-6B on final drifted to the right and struck a parked helo on deck. The ensuing chain reaction with other aircraft and loaded weapons resulted in 14 deaths, 48 injured Sailors, and 18 aircraft destroyed or severely damaged. The mishap investigation found that



the EA-6B pilot had been self-medicating for cold symptoms and had nine times the therapeutic levels of brompheniramine, an antihistamine, in his blood.

You've heard the stories, and it's obvious: when we lose highly trained and valuable people and aircraft to mishaps, it's costly. And many of those mishaps occur because of human and aeromedical factors, the sorts of causal factors which specialists in aerospace medicine are trained to prevent. When we look at mishap statistics in naval aviation, almost 90 percent of our mishaps have human error as a contributing factor, and more than half have other aeromedical factors.

Most medical folks are trained to take care of sick patients who live in a normal environment at ground level. But aerospace medicine is just the opposite of that. Aeromedical specialists, such as those listed in the introduction, are educated to care for individuals put in the very unusual environments of aviation. Humans didn't evolve to operate at high altitude in thin air, with high sustained rates of rotation, at high Gs, for long hours at night, under extremes of heat and cold, at high speeds with limited visibility, and hunched over in a vibrating cage with a weight on your head. To help you do these sorts of things, you've got instruments, supplementary oxygen systems, survival gear, body armor, night-vision goggles, and other equipment. Each of these, however, produce their own additional sets of problems.



WHO ARE THESE AEROMEDICAL PEOPLE AND HOW CAN THEY HELP YOU?

The naval flight surgeon is a fully trained physician, with at least one year of practical experience as an intern before being licensed as a medical doctor or doctor of osteopathy. The naval flight surgeon receives a full six months of additional training in aerospace medicine at the Naval Aerospace Medical Institute in Pensacola (NAMI), including extra clinical exposure in specialties important to aviation, such as ophthalmology, cardiology, psychiatry and ENT. They also get fixed- and rotary-wing flight training in T-34s and TH-57s. They write your upchit.

A few flight surgeons, about 10 percent of the 300, make aerospace medicine their chosen specialty and stay in aviation medicine for their career. They then become certified and work in senior flight-surgeon billets throughout the Navy and Marine Corps.

The squadron corpsman files your upchit and manages your medical records, tests your blood pressure and eyes, does your audiograms, and takes your EKG. The corpsman probably is an AVT, with at least 10 weeks additional training at NAMI in aviation medicine and administrative requirements.

When you go to the pool and the altitude chamber for your physiology-refresher training, the APs will get you through the dunker, the reduced-oxygen breathing device (ROBD), the night-vision labs, and all the required initial and periodic physiology training. The AP has at least a master's degree in one of the life sciences, plus the NAMI six-month course and additional experience. Physiologists who complete the aviation-safety officer course in Pensacola become designated as aeromedical-safety officers or AMSOs. They serve as staff in training programs, are involved in mishap investigations, and support the flight surgeons.

A few really cerebral PhDs become aerospace-experimental psychologists (AEPs), who specialize and make their careers in aviation-experimental psychology. These big brains understand how other people's brains work, particularly aviators, who tend to throw the wrong switches from time to time, misread instruments, and such. AEPs make a career of understanding the man-

machine interface, the relative importance of authority gradients, the transference of learned behaviors to novel aircraft designs, and a bunch of other things I only dimly understand. They invented the human-factors analysis and classification system (HFACS) you'll use if you serve on an aircraft-mishap board. You'll find AEPs in teaching jobs and working behind the scenes to make your life safer. Thank them when you climb into a cockpit and find it's intuitive and easy to operate.

NOW THAT YOU'VE GOT ALL THIS HORSEPOWER AT YOUR SERVICE, HOW DO YOU USE THEM?

Unfortunately, the typical aviator tends to avoid contact with all of these aeromedical people, feeling that the lower profile he makes, the less a target he becomes. The aviator believes the best he can do at an annual physical exam is to break even and avoid a grounding diagnosis or medical condition that will interfere with his flying career. Medical records historically have been thin right up to the time aviators go in for their retirement physical, when all of a sudden, it blooms out of all proportion with hidden medical complaints and symptoms the pilots feared might have been grounding criteria in their flying days. Avoid the "NAMI whammy" at all costs.

Times have changed. You'll find flight surgeons and the other aeromedical specialists work hard to keep you flying and will do whatever possible to keep you in the cockpit in the best possible condition. All these aeromedical folks are required to fly at least four hours per month. We tend to think this is to maintain our flight pay, but that's backwards. The real reasons aeromedical specialists are required to fly is so they'll understand your work and the unique stresses you face—and flight pay is hazardous-duty pay. The more they know, the better advice and help you'll get, so invite them along; they'll jump (fly) at the opportunity.

How good is your flight equipment and does it do the job it's supposed to? Is your exposure suit comfy? Do you like to wear your oxygen mask all day? Do you like the plush cushion on your ejection seat? Does your equipment fit? A support staff of aeromedical specialists, engineers and researchers are at NAVAIR. Their job is to get you the most functional equipment possible to protect you while flying. Do they know your needs? Do you know how to contact them?

How much do you know about dehydration, heat stress, spatial disorientation, emotional stress, hypoxia, fatigue, night-vision devices, kidney stones, or high blood pressure? Call your FS and AMSO and get them to give you and your squadron regular briefs on all these topics. Sure, you get some of this info every four years at physiology training, but there's much more to know. Start with the big ones: SD, fatigue, hypoxia, G-LOC, and work your way down the list.

Are you using nutritional supplements? Vitamins? Energy drinks? For what? Are the pills you're taking allowed, and do they do anything to help you? Are they safe? Do these supplement manufacturers test these pills on people in altitude chambers, or while on centrifuges, or after being awake for 36 hours? The commercial drug companies don't even do that for their prescription drugs, and they're regulated by federal law. Get your docs into your spaces to brief these sorts of things periodically.

Got a bit of a cold, but can clear your ears? What about the other eight airspaces called "sinuses" in your head? You can't check those before you fly, but you'll sure notice one or more of them when you start to descend and can't clear one. The mucus membrane gets sucked off the bone, and the hemorrhage fills up the remaining air space, causing incapacitating pain. Talk to your flight surgeon when you get those little annoyances that mere mortals just self-medicate and suffer through. If you get a sinus squeeze, you may be grounded for four to six weeks while it heals, but we'll get you back flying.

Vision problems? Rather than squinting on your annual eye test, get your eyeballs machined and be back in business shortly. Got a little "white coat" high blood pressure, or a cholesterol count that is creeping up, despite the best burger, fries and shake diet you can find? Your flight surgeons can get you on effective treatment and still get you waivered to fly, so you'll live to enjoy retirement with your family after all the fun's over.

If you've got a friend who has one of these, have him check out the NAMI website, where it tells him exactly what care he needs and what's necessary to keep him flying: www.med.navy.mil/SITES/NAVMEDMPTE/NOMI/NAMI/ARWG/Pages/AeromedicalReferenceandWaiverGuide.aspx.

The Navy has spent big bucks and much time and effort to provide you with the best aeromedical services to keep you flying. Use them, task them, and involve them in your mission. You'll be happy and safer with the results.

Capt. Davenport is the Head, Aeromedical Division, Naval Safety Center.

YOUR EYES... THEIR TARGET

Lasers and the Aviator

By Cdr. Michael Reddix, MSC and Lt. Leedjia Svec, MSC

Sixty-five percent of our sensory input is visual, making it a priority for protection and preservation, especially in the visual-driven aviation environment. Unfortunately, this most important sense is threatened by lasers. From the aviation platform to high-tech entertainment, the advancement of laser technology has resulted in a proliferation of laser-related devices. With the increase in laser use comes an increase in the chance of laser-induced eye injury. Most eye injuries are preventable, with proper understanding.

RECENT AVIATION HARASSMENT LASER EVENTS

Laser illumination incidences are happening, and they are a detriment to flight safety. The number of commercial and military pilots who report a lasing incident has increased with the proliferation of lasers, particularly inexpensive green laser pointers and red laser aiming devices. Laser incidences range from accidental exposure while in training exercises to purposeful exposure in combat. Exposure even can come from laser pointers on the ground. While most pilots continue flying, some have been injured.

WHAT ARE THE EFFECTS OF LASER ILLUMINATION ON THE MK-1 AVIATOR EYE AND FLIGHT OPS?

Lasers may cause glare, flash blindness, and after images, as well as physical pain and psychological discomfort.

Glare occurs when excessive amounts of light interferes with vision, reducing your contrast. For aircrew, glare may result from several different interactions with lasers. These include lasers illuminating the cockpit windshield or other outer surfaces (such as a body of water), a pilot's eyes, and the interior of the aircraft (such as the controls, instruments, or even corrective lenses or eye protection). In all these instances, glare may arise, temporarily reducing one's ability to see, as well as causing pain or discomfort.

After you have been lased, whether glare has occurred or not, you may experience flash insensitivity and after images. Flash insensitivity is also known as flash blindness. The most common example is flash photography. After images are the visual persistence of an image after the stimulus causing that image has gone. This effect occurs through intense or prolonged stimulation. Both these phenomena can interfere with flying your aircraft by obscuring your central vision.

DAMAGE

Damage to the visual system from lasers range from mild and reversible to permanent. Injuries range from burns on the cornea or retina, holes, hemorrhages, retinal scarring, macular holes, and macular cysts. It is possible that the complications from an untreated injury will cause more damage than the injury itself. Injury is amplified by the use of attenuating media, such as NVGs and other optical systems. It is extremely important to speak to your flight surgeon if you suspect you have been lased.

Introduction to Lasers

Laser is an acronym for light amplification by stimulated emission of radiation. Lasers convert incident electromagnetic radiation of mixed frequencies to discrete frequencies of highly amplified and coherent ultraviolet, visible, or infrared radiation.

Lasers range in size from semiconductor devices no bigger than a grain of salt to high-powered instruments as large as an average living room. Lasers can be so powerful that their power, concentrated at a single point, easily can be a billion times the intensity at the surface of the sun. Commercial lasers are applied in such areas as welding, machining, measuring, tracking, and surgery. Military lasers are applied in range finding, target designation, illumination, detection, and weapons aiming.

WHY ARE LASERS A THREAT TO AVIATORS AND THE AVIATION MISSION?

The aviation environment frequently uses lasers for range finding, detection, weapons, warning systems, training, and more. Lasers viewed with an aided eye (such as wearing night-vision goggles) attenuate exposure and injury. Lasers also may be used for the intentional purpose of temporary visual disruption, which may be caused by visual glare, flash blindness, or after images. Although these effects are temporary and do not damage tissue, they significantly may degrade performance, especially at critical times, such as takeoff or landing, where lasers most likely are to be used.

MITIGATION

To minimize exposure effects, it is important to take several actions; these include avoidance (flying over known areas of exposure) and laser-eye protection (LEP). As common sense as it may sound to avoid looking directly at the laser, it is normal human reaction to turn to the source of stimulation and give it more attention. When you suspect you are being lased, you should put your head down and avert your eyes.

LASER EYE PROTECTION

One of the best means of protecting yourself is to use LEP, which may be in the form of spectacles or visors, either worn alone or in combination with other personal-protective equipment (PPE). Laser eye protection may cover a broad range of wavelengths or just a small notch of the spectrum, where a known threat laser operates. Though all LEP inhibit the transmission of laser wavelengths, they differ greatly in their performance, so choose your LEP carefully and ensure a proper match. The right LEP will be compatible with your cockpit lighting and will let you see your instruments and warning lights.

Another means of protection is the airborne laser-event recorder. This recorder can collect data on the laser threat and allow you to deploy specific tactical or material mitigation solutions. This recorder is mounted on your aircraft in a strategic area and is instrumental to protection. NavAir human systems can help you here.

Cdr. Reddix and Lt. Svec are with the Naval Health Research Center Detachment, Directed Energy Bioeffects Laboratory.

WHO DO I REPORT TO?

NASIC Laser Incident Report email box: laserincidentreport@ds.naic.wrightpatterson.af.smil.mil

What to do if you are exposed.

Report when you are lased or think you have been lased. When reporting the exposure event to your flight surgeon, you should try to relay the following information:

What color was the laser?
From which direction did it come?
What did you perceive?
Did you perceive it in one eye or both eyes?
Were you in a training exercise or performing an operational mission?
Do you know what the laser was? (You might know for example, that it came from a range-finding device on a team member's aircraft)
How long do you believe you were being lased?
Did it interfere with your aircraft operation? If so, how?
Was your vision obscured after the laser was no longer present?
Did you have any after images and if so, what color were they and what size?

When Pigs Flu

By Lt. Logan Ridley

During the ORM portion of every flight brief, we ask, "Are there any personal stressors?" This broad question is designed to catch any ORM factors that could affect someone's performance. It's a fair question, and looking back at one time when I was asked, I probably was dishonest in my answer.

The H1N1 influenza virus, commonly referred to as swine flu, had become rampant across our ship after a port call to Perth, Australia. This flu is incredibly contagious, and we had been warned about proper hygiene, wearing masks, washing hands, and symptoms. I, however, have been proud of my strong immune system and tend toward the "invincible" mentality when it comes to health issues. Unfortunately, even I was unable to avoid this dreaded strain.

I awoke that morning feeling a little lethargic. I told my carrier aircraft plane commander (CAPC) how I felt and wrote it off to a bad night's sleep. Even though I just had flown with another squadronmate, who fell to the virus two days earlier, I refused to believe I was getting sick.

We prepared for our night triple cycle that was to culminate in a trap-cat-trap (TCT). Our CAPC decided not to continue with the TCT because of fuel considerations, meaning I was to stay in the copilot's seat the entire flight. His late decision helped me decide that I was fine to continue because, after all, I wasn't going to be the one getting a night trap. That critical question, "Any personal stressors?" remained a "No."

Once airborne, I quickly realized my little case of lethargy was developing into something else. I became a passenger. My body started to ache, I got the chills, and my head started to hurt. My penance for not rogering-up to feeling bad was to suffer a 4.6-hour night flight over the coast of Australia. Even worse, we cancelled the TCT, which meant I also had to forgo the manually-operated-visual-landing-aid system (MOVLAS) "green machine."

After landing, I went straight to medical where I was immediately quarantined in a full 48-man berthing, with cold food and sick people. I emerged 72 hours later, still regretting I had not had the maturity to cancel my flight.

If something appears to be dumb, dangerous, or not right, then it probably isn't a good idea. The lesson I first learned in flight school about taking "sick" airplanes had been relearned in my body. It told me something wasn't quite right, but I was too stubborn to listen. In the CVN environment, especially at night, complacency has to be battled, and invincibility must be conquered.

Had the scenario proceeded differently, and I had to be an active crew member, chances are my performance would have been subpar and could have endangered the crew.

Lt. Ridley flies with VAW-115.

Please send your questions, comments or recommendations to:

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Flight SURGEONS—Let's Just Get Rid of Them

By Cdr. Pete Wechgelaer, MD, MPH

Do we really need flight surgeons? We aren't really using them anymore.

Heresy coming from a flight surgeon, perhaps, but from what I recently have seen, we aren't using flight surgeons the way we used to, nor are we using them the way they were intended. In my present job with the Safety Center, I travel a lot and look at things aeromedical, and I want you to know the flight surgeon can be a valuable member of your squadron. Here's my observations from the road.

On a recent trip, I met what you might call a "fast jet" pilot. When I went to greet him, he waved me off as if his hand just had come out of a cast and still hurt. He had "grounded" himself after determining it hurt too much to fly. His broken arm had been treated outside Navy medicine. Think about that for a while. A check of his trusty NATOPS jacket revealed no grounding chit. The omniscient medical computer system also had no record of the parting of bones or any other body-part problems.

The flight surgeon and aviator may have prevented the "hurt too much to fly" scenario if they had teamed to plan for a monitored return to flying duty. Where was the doc? Why wasn't he involved with this aviator's arm problem? As I recall, he was splitting time with the clinic. Access and availability are important criteria for the flight surgeon to be effective in the squadron. More importantly, the aircrew must know the flight surgeon is the "go to" guy for all medical needs.

A flight surgeon's time routinely is pulled in different directions, between squadron time and clinic time. Deployments, schedules and a limited number of flight surgeons make it difficult for docs to spend needed time in squadron spaces. The hangar should be a familiar place, and that's not always the case.

I have gotten in the habit of asking the CO or XO how often they see their flight surgeon around the squadron. An increasingly common reply is, "They're here for the human-factors councils (HFCs). I have their cell number, and it hasn't been a problem to call in the doc if an issue comes up." Is that enough, considering human factors contribute to more than 80 percent of our aviation mishaps? Let's not forget the value of having a doc in the squadron.

The Squadron Flight Surgeon

The flight surgeon's role was established to ensure the highest possible level of health and safety for aviation squadrons. Flight surgeons can most effectively fulfill their responsibility of preventing accidents and improving military readiness through frequent, close personal observation of the unit personnel in the unit work environment. Flight surgeons shall spend 50 percent of their regular duty time directly engaged in aeromedical activities in the unit work area, i.e., squadron spaces.

—Reference OPNAVINST 6410.1, Utilization of Naval Flight Surgeons

Why do we have flight surgeons in the first place?

Flight surgeons are supposed to mitigate the risk of flying. Flight physicals, as annoying as they are, miti-

CNAF flight surgeons (FSs) are assigned to functional wings, air wings, squadrons, and air stations. While so assigned, primary administrative control remains with the parent command, with the duties assigned by the commanding officer. The FS's primary duties are to serve both as the primary care manager for his assigned units personnel and a key player in the unit's aeromedical safety program. A significant role of the FS is to prevent accidents and improve unit operational performance and readiness.

Duties of a flight surgeon include:

- Become an integral part of each assigned squadron's safety program and provide the commanding officer with operationally oriented aircrew surveillance.
- Keep the commanding officer informed of aeromedical factors that may affect operational readiness.
- Participate fully in squadron safety functions/boards, human factors boards/councils, and physiologic hazards reporting.
- Investigate known or perceived toxicological/environmental hazards associated with flight and/or maintenance and repair of aircraft. Participate in premishap planning, premishap drills, premishap training, and evaluate search and rescue procedures.
- Investigate aircraft mishaps. Participate as a member of the aircraft mishap board (AMB), and complete the aeromedical analysis (when required).

—Reference COMNAVAIRFORINST 6000.3A, Flight Surgeon (FS), Aviation Corpsmen (AVT), and Flight Corpsmen (SAR/AVT) Duties, Responsibilities and Utilization.

gate risk, as does the whole process of "grounding" the sick or broken, and reevaluating to get an upchit. While some of what is done in a clinic setting is to mitigate risk, taking care of the squadron's personnel must be considered a priority. How does a flight surgeon participate, meaningfully, in a human-factors council or board, such as FNAEB, FFPB, or AMB, if their exposure to squadronmates is limited?

ACCESS TO CARE

We have a term in medicine called "access to care." Consider this term an additional reason the doc needs to be in the squadron. During the beginning of OIF, I was one of a few docs left on my base. If I was running late for morning sick call, I had to modify my daily route to the clinic, bypassing the long passageway in the hangar. Why? I never made it through the hangar without being stopped by someone with a question or a problem. As busy as I was back then, before and after my time at the clinic, I was at the squadron. I know the time spent in the hangar made a positive impact on our ability to carry out the mission.

Before I entered the world of medicine, I was an aviator. I remember feeling very much like I was one of Uncle Sam's lab rats. Every time I had the slightest medical issue, or even wanted to take an aspirin, I was expected to talk to my flight surgeon. Every time I saw any other doc, I had to see my flight surgeon afterward to see which of the recommended treatments I could do, or what meds I could take. I want to make sure today's aviator continues to work that close with our docs. As I said, recent visits to squadrons indicates we have to reemphasize the value of our flight surgeons and use them to their full potential.

Remember, flight surgeons work for a CO. While we see increasing demands at our clinics, let's not think flight surgeons can "take care of the squadron" from the clinic. If we accept that idea and believe it contributes to safety, we don't need squadron-assigned flight surgeons anymore. I'm not willing to accept that. Knowing how much flight surgeons can contribute, we need to exploit their expertise in the squadrons.

WHAT'S THE FIX?

Often we hide these complex philosophical solutions in "instructions," and OPNAVINST 6410.1 comes to mind. CNO says flight surgeons are so important to safety that no less than 50 percent of their time is to be spent in the squadron. CNAFINST 6000.3A gets more specific on flight-surgeon duties, responsibilities and utilization. See the sidebars with this article.

Cdr. Wechgelaer is an aeromedical analyst, Naval Safety Center.

I wandered into a squadron office and noticed two boxes of Dayquil on, yes, the safety-officer's desk. I also saw a very large energy drink, which contained banned substances. He was an aviator with a cold, self-medicating, and using banned supplements. He wasn't too pleased when I impolitely reminded him that his flight-surgeon's office was less than 100 feet away, he had better medications, and they were all free. Can you guess what happens when you mix phenylephrine, a rather potent stimulant, used during surgery to increase blood pressure, with the unregulated stimulants in energy drinks? That's right, I don't know either, but do you want to do that experiment?

Got Energy Drink?

By Cdr. Don Delorey

In today's high-op tempo, fast-paced world, energy drinks have become the trendy beverage of choice for many people, including many in naval aviation. Their popularity clearly is evident by a visit to any convenience store or Navy geedunk. You find rows and rows of flashy cans, sporting names like "Rock Star," "Monster" and "Spike." Many people have bought into the lively image and down them like sodas. Is this just another harmless fad, or are real health risks associated with energy drinks?

The term "energy drink" refers to a beverage that contains caffeine and other ingredients, such as taurine, guarana, and B vitamins, that claim to provide you with extra energy. However, an energy drink is a can of soda on "steroids." Both are carbonated beverages containing caffeine and sugar. The big difference is the typical energy drink contains a lot more of both ingredients.

For example, the average soda has 25 to 40 milligrams of caffeine, whereas most energy drinks have double that amount. One new energy drink advertises a whopping 280 milligrams of caffeine per can. When this much caffeine lingers in our system too long, insomnia may follow. Insomnia is a risk with any caffeinated beverage, but the risk is greater with energy boosters because of the massive amounts of caffeine.

The main health risk associated with consuming these quantities of caffeine is its effect on heart rate and blood pressure. The caffeine content of a single serving of an energy drink (8 to 12 fluid ounces) can range from 72 to 150 mg; many bottles contain two to three servings, raising the caffeine content to as high as 294 mg per bottle (Table 1). In comparison, the caffeine content per serving of brewed coffee, tea, and cola beverages (8 fluid ounces) ranges from 134 to 240 mg, 48 to 175 mg, and 22 to 46 mg, respectively. Thus, with large doses of caffeine, the heart rate can become so accelerated it may lead to an irregular or quickened heart beat. This condition can last long after the initial effects of the drink, and for people with heart conditions, this can be very dangerous.

Table 1. Caffeine and sugar content of energy drinks.

Drink	Serving (fl oz)	Servings Per Container	Sugar Per Serving (g)	Caffeine Per Serving/ Container (mg)
Diet Rockstar Energy Drink	8	2	0	80/160
Full Throttle	8	2	29	72/144
Go Girl Sugar Free	12	1	0	150/150
Lo-Carb Monster XXL	8	3	3	80/240
Monster Energy Assault	8	2	27	80/160
Red Bull 8.3	8.3	1	27	80/80
Red Bull Sugar Free	8.3	1	0	80/80
Rockstar Energy Drink	8	2	30	80/160
Rockstar Juiced	8	2	21	80/160
Wired 294 Caffeine	8	2	26	147/294

Caution also is warranted for healthy adults who consume energy beverages; the consumption of two or more in a single day can lead to excessive caffeine intake.

A SYNERGISTIC EFFECT ALSO CAN OCCUR, as other stimulants, such as guarana and ginseng, often are added to energy beverages and can enhance the effects of caffeine. Guarana contains caffeine (1 g of guarana nearly is equal to 40 mg of caffeine) and substantially may increase the total caffeine in an energy drink. Adverse effects associated with caffeine consumption in amounts of 400 mg or more include nervousness,

irritability, sleeplessness, increased urination, abnormal heart rhythms (arrhythmia), decreased bone density, and stomach upset.

There is limited evidence that consumption of energy drinks significantly can improve physical and mental performance, driving ability when tired, and decrease mental fatigue during long periods of concentration. Unfortunately, the literature is limited, and we don't know whether these improvements are because of the caffeine, other herbal ingredients, or are a result of the combination of the ingredients found in the beverage. Tables 2 and 3 present the energy drinks' claims and the scientific evidence regarding these claims.

Bottom line, while in a flight status, energy drinks are not authorized. If you have any questions, contact your flight surgeon or aeromedical safety officer. Your flight surgeon will have specific recommendations on use of caffeine as a drug to maintain performance.

Cdr. Delorey is the aerospace physiologist at the Naval Safety Center.

Table 2. Energy drinks ingredients and claims.

Ingredient	Drink	Functional claims
Carnitine	Monster, Rockstar, Full Throttle	Improves endurance, increases fat metabolism, protects against cardiovascular disease
Glucuronlactone	Go Girl Sugar Free, Red Bull, Monster	Promotes excretion of toxins and protects against cancer
Guarana	Monster, Rockstar, Full Throttle	Increases energy, enhances physical performance, and promotes weight loss
Inositol	Go Girl Sugar Free, Red Bull, Monster, Rockstar, Wired B12 Rush	Decreaces triglyceride and cholesterol levels, lowering risk of cardiovascular disease
Panax Ginseng	Monster, Rockstar	Speeds illness recovery; improves mental, physical, and sexual performance; controls blood glucose and lowers blood pressure
Super Citramax (hydroxy citric acid, garcinia cambogia extract)	Go Girl Sugar Free	Suppresses appetite, resulting in weight loss
Taurine	Go Girl Sugar Free, Red Bull, Monster, Rockstar, Full Throttle	Lowers risk of diabetes, epilepsy, and high blood pressure
Yohimbine HCl	VPX Redline	Improves sexual performance and promotes weight loss

Table 3. Scientific evidence to support these claims.

Ingredient	Scientific evidence
carnitine	There is no clinical evidence that carnitine use is effective for increased endurance or weight loss, but it may protect against heart disease.
glucuronlactone	Scientific evidence does not exist to support claims regarding the efficacy of glucuronolactone.
guarana	A major component of guarana is ceffeine. Caffeine consumption has been associated with increased energy, enhancement of physical performance, and suppressed appetite.
inositol	Scientific evidence does not exist to support claims regarding the efficacy of inositol.
panax ginseng	Scientific evidence does not exist to support claims regarding the efficacy of panax ginseng
super citramax (hydroxy citric acid, garcinia cambogia extract)	There is scientific evidence that use of this supplement decreases food consumption.
taurine	Clinical evidence is insufficient to show that taurine is effective in treating diabetes or epilepsy, but it may lower blood pressure.
yohimbine HCl	Although yohimbine HCl may increase blood flow to sexual organs, there is no evidence that it increases sexual arousal. It may be effective at treating erectile dysfunction. Currently no evidence exists to support the claim that use of this supplement leads to weight loss.

A Lifetime of "WHAT?" and "HUH?"

By LCdr. Gonzalo Partida and Lt. Ryan Broderick

Let's talk about the most common occupational illness affecting aircrew, maintenance and admin personnel. Any guesses? Here is a hint: The effects are irreversible once it occurs. It's not loss of sight because of staring at the sun, although it is just as preventable. The correct answer is hearing loss, and it's routinely ignored because there are no immediate noticeable effects, although the long-term effects are devastating.

THE STORY. A personal account of hearing loss from one "Screaming Eagle" has had more influence on our squadron's hearing-conservation program than reading statistics at our safety stand-downs. He shares this story with every check-in.

"In 2001, fresh off my first deployment, I was told my hearing significantly had decreased. I had carried double-hearing protection with me in the beginning, but we used to keep our foamies in the button hole on our collars. When that practice no longer was allowed, keeping them on hand was an inconvenience that could not be overcome, or so I thought. People sometimes joke about the disability pay, but they aren't thinking of a lifetime of whats and huhs. It's nothing to be proud of. For me, it took too long for the message to sink in. Now, grabbing the foamies from the box inside of the door to my shop, or any shop, is not an inconvenience, but the standard."

Since then, the victim has taken his hearing much more seriously. Eight years later, as the shop LPO, he passes on the lessons he learned and sets the example for hearing protection. His story has helped change for the better our mindsets toward hearing protection. He told me, "I can't afford not to." The importance of double-hearing protection, or any hearing protection, has been on posters and safety message boards for a long time. "I owe it to my shipmates to protect them," he said.

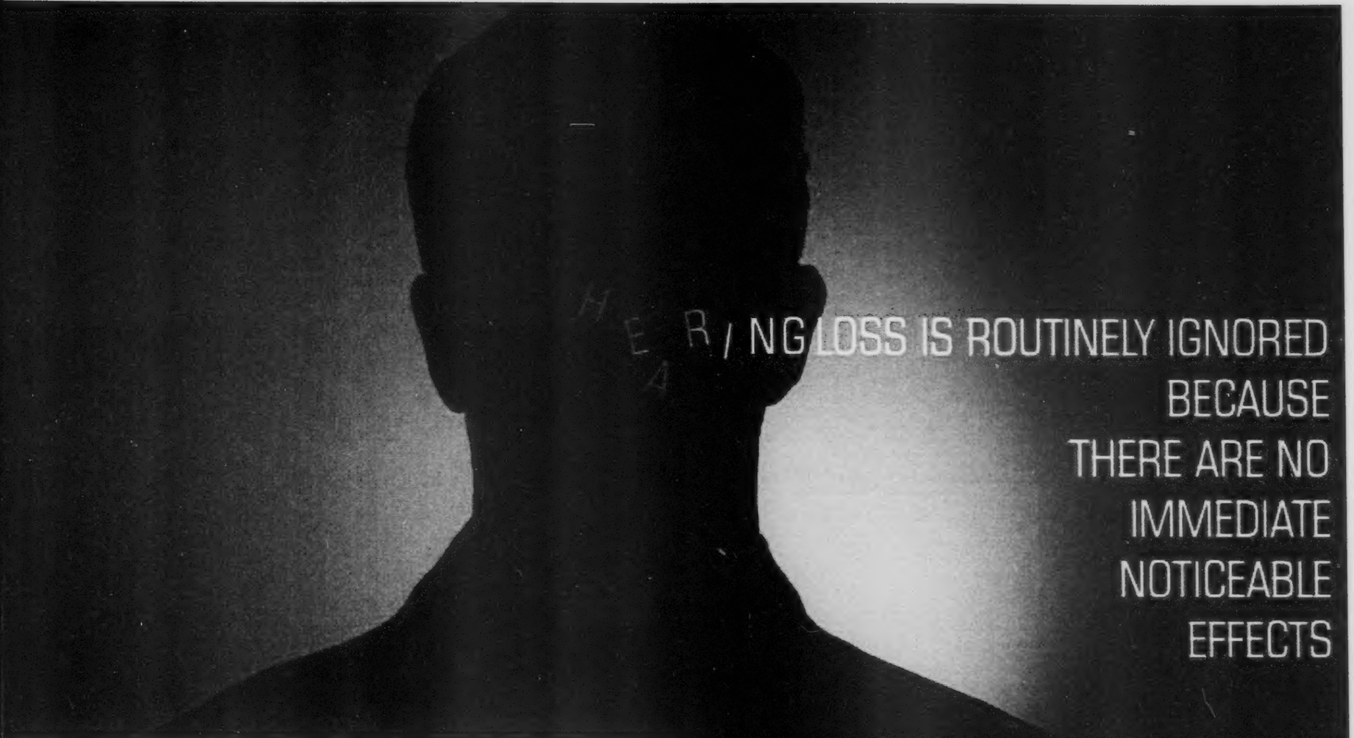
THE RULES. The Department of Labor's standard for maximum sound exposure is 90 decibels (db) for up to eight hours a day. The Navy standard is 84 db, which should sound familiar, as part of our hearing-conservation program requires us to wear hearing protection above these levels, and double-hearing protection above 104 db.

SO WHAT LEVELS DO WE EXPERIENCE IN OUR WORKSPACES? Believe it or not, this topic came up on a flight when my sensor operator (SS-3) showed me the decibel-meter application he downloaded to his iPhone. This most amazing piece of technology displayed 85-db-peak levels while airborne. While the iPhone is impressive, we obtained our data from a 2006 study conducted by Naval Hospital Oak Harbor using OSHA-approved audiometers. An 88-db-average level with peaks of over 100 db was measured throughout the aircraft. These levels are comparable to operating a gas-powered lawnmower or motorcycle.

RECREATIONAL NOISE IS ANOTHER MAJOR SOURCE OF HEARING LOSS. The advent of 18-inch subwoofers, amplifiers and technological advances in earbuds and headphones also compound the problem. If you've ever been at a stoplight next to a car whose trunk rattles like a snare drum, imagine what that noise is doing to their, and your, inner ear. Now, imagine placing a set of custom-fitted earbuds inside your inner-ear canal. These advanced earbuds eliminate almost all ambient noise and allow you to hear your heartbeat while pumping up to 119 db of power-directed-sound energy directly into your eardrum. The sound is astonishing—and so is the potential damage.

HOW DO WE FIX THIS PROBLEM? We pay attention to the environment and limit our exposure. We don't pay lip service to our program, and we train the next generation on the importance of hearing conservation. Just meeting the minimum requirements is not advisable when the hazards result in permanent damage.

When is double-hearing protection required? My standard is that it is required whenever practical. Our wing standardization notes also apply some common-sense logic to the equation by requiring that personnel at least have double-hearing protection available when transit-



ing to aircraft on the flight line, and that it be worn when within 100 feet of the aircraft. During preflight, I often ask people why they choose not to wear foamies inside the aircraft, which provide up to 29 db protection. Common responses include, "I can't hear when people speak to me," or "Those aren't required by NATOPS." If someone can't hear me, I simply can raise my voice, and the problem goes away. You may lose your voice, but that will come back; if you lose your hearing, it never will return. As for NATOPS, I ask that we refer to the preface regarding the use of sound judgment and apply accordingly.

THE COSTS. The true costs cannot be measured. This mostly avoidable problem costs the Department of Veteran's Affairs more than $100 million a year, affecting more than 18,000 Sailors. While those numbers are staggering, what we can't measure are the effects on those Sailors' daily lives. Having the hearing of an 80-year-old when you are only 40 is a reality for some of our Sailors. Tinnitus is another possible result of long-term hearing damage, causing a distracting ringing in your ears 24 hours a day. Vertigo or balance disorders also can result from long-term exposure and subsequent damage to your inner ear. Somehow, this does not make the 10-percent disability payment worth it.

As a community, we must make a conscious decision to protect ourselves and our Sailors. Next time you are near an operating auxiliary-power unit (APU), conducting preflight or mowing your lawn, take a second to encourage your fellow Sailors to do all they can to conserve their hearing.

The question I would ask you now is: How long are you willing to stare at the sun?

LCdr. Partida and Lt. Broderick fly with VP-1.

The decibel (dB)? It's named in honor of the inventor of the telephone, Alexander Graham Bell. A "deci" is one-tenth, so a decibel is one-tenth of Mr. Bell. Well, not quite...

The math's a bit complicated, but the decibel measures how much louder one sound is than another. If you're interested in the formula, you can look it up in wikipedia or a number of other places, but it's based on logarithms and multiples of 10. If a sound is 0db, then that's probably the quietest sound you can hear, if you've got great ears without any damage. If the quietest sound you can hear measures 3db, then the sound has to be twice as loud before you can hear it, because each 3db increase doubles the sound pressure of the one below it. If you can only hear sounds of 10db, you're hearing sounds 10 times the sound pressure level that the best ears can detect; 20db is 100 times higher, 30db is 1000 times higher, etc., etc. That means that 84db, the point at which we try to limit your daily exposure, is a sound-pressure level about 251 million times higher than the best hearing capability, which, over time, permanently will damage your ears. With this exposure you won't hear Mr. Bell, or anyone else over the phone or elsewhere, in the future. Wear that hearing protection!

Improving Human Systems

By LCdr. Sidney Fooshee and Katie Smith

The Human Systems Department at the Naval Air Systems Command (NAVAIR) provides life-cycle research and engineering to optimize operator and maintainer effectiveness and survivability through human performance, training and hardware solutions.

The three major sites within navair are:

• Naval Air Warfare Center Aircraft Division (NAWCAD, Patuxent River, Md.)

• Naval Air Warfare Center Training Systems Division (NAWCTSD, Orlando, Fla.)

• Naval Air Warfare Center Weapon Division (NAWCWD, China Lake, Calif.)

They provide resources, products and services to improve the human within the aviation system, including the entire complement of aviation-support facilities and equipment on aviation-capable ships.

In NAVAIR's Competency Aligned Organization/Integrated Product Team (CAO/IPT), the CAO is responsible for people, facilities, processes, and technologies, and the IPT is responsible for program-cost schedule and performance. They work as a team to meet fleet requirements through acquisition and in-service support.

Through their many programs, the Human Systems Department supports more than 1,000 customers each year. Aircrew Systems (PMA 202) and Training Systems (PMA 205) are their largest customers, stretching across the three NAWC locations.

NAWCAD, Pax River, focuses on research and development (R&D), human-systems integration (HSI), and human-factors engineering and applied crew-station-design functional analysis. They also provide systems to ensure optimal in-flight aircrew escape, crash survivability, protection of aircrews from threats in and out of the crew station, and enhance aircrew-mission performance.

Three special focus areas within human systems at NAWCAD are the Investigation Support Team (IST), the Fleet Air Introduction/Liaison of Survival Aircrew Flight Equipment (FAIL-SAFE), and the In-Service Engineering Office (ISEO).

The IST focuses on proper recovery, handling and investigation during a mishap, contributing factors, and marginalities of success. Through analysis of evidence and subsystems, the IST can provide insight to the actions of the aircrew before and during the mishap. This information helps define the corrective actions for eliminating recurrence of the same failure or to validate and enforce adequacy of current system design and operating procedures. For more

...your comments and feedback are key to the process.

information, contact the IST lead at (301)757-1617.

The FAILSAFE team is the primary point of contact between aircrew/aircrew systems and provides fleet liaison and headquarters support for aircrew-systems products and assessments. They also provide feedback to PMA 202 on the effectiveness of the products, subsequent modifications, aircrew and aircrew systems maintenance personnel acceptance of the product, and results of assigned fleet assessments and surveys. For more information, contact the FAILSAFE lead at (301)342-8432.

The third focal point located at Pax River is the In-Service Support Center (ISSC). The ISSC is responsible for all man-mounted, life-support-systems products, and includes aircrew-restraint/parachute harnesses and their interfaces with the aircrew-personal equipment, as well as survival-kit-container contents. For more information on ISSC, call (301)342-9226.

NAWCTSD, Orlando provides systems and project engineering expertise and services involving acquisition and life-cycle support of simulation and training solutions. NAWCTSD oversees the In-Service Engineering Office (ISEO) and has 43 offices located throughout the United States and Japan, dedicated to providing on-site, cost-effective support of fielded training services. By keeping training systems current, making fidelity improvements, and implementing the training system life-cycle-management plan, they are the frontline representatives and conduct valuable liaison work among the fleet, the customers, and NAVAIR. For more information on ISEO, call (407)380-8563.

The NAWCWD, China Lake In-Service Support Center (ISSC) directly supports safety-related engineering investigations on parachutes and restraint harnesses (when discrepancies are reported via the Joint Deficiency Reporting System, or JDRS and for gear used in aircraft mishaps. Inspection bulletins, maintenance advisories, and design changes can result as corrective actions if warranted by the risk-assessment process. Collocated with the ISSC is the repair depot that is responsible for packing and vacuum sealing the parachute and life-raft assemblies used in the P-3 and E-2C aircraft. For more information, contact the ISSC team lead at China Lake, (760)939-0802.

The NAVAIR team is dedicated to improving your performance, and your comments and feedback are key to the process.

LCdr. Fooshee and Ms. Smith are with NAVAIR.

Mishap-Free Milestones

VFA-2	100,000 hours	23 years
VR-56	157,000 hours	33 years, 6 Months

Human Factors Councils

By Cdr. William L. Little (Ret.) and Lt. Peter B. Walker, MSC, Ph. D.

Since the first powered flight, human-caused factors have been the greatest contributor to aviation mishaps. However, because of innovations, better training, and more reliable equipment, the mishap rates have declined. During the 1930s, we had about 300 mishaps for every 100,000 flight hours. At the onset of World War II, the rate was less than 100 per 100,000 hours. Recent rates are two or less per 100,000 hours—a dramatic improvement.

Naval aviation always has sought aviators with the "right stuff." However, it's been a challenge to identify exactly what is the "right stuff" and how that dimension could be assessed. For example, many of the attributes that are desirable for aviation also involve some aspect of risk-taking behavior. Just how does a squadron try to identify risk-taking behavior that goes "over the top" and becomes excessive?

A little more than 30 years ago, the term "high-risk aviator" began to show up in literature, and aeromedical specialists became concerned with both identifying these high-risk individuals and discovering what types of strategies might be used to mitigate this behavior. One pioneer of this research, Dr. Bob Alkov, a former naval aviator and analyst in the aeromedical department of the Naval Safety Center, has spent a lifetime examining aircrew-coordination training (ACT) and identifying and working with high-risk aviators. His research was instrumental in getting the Naval Training Systems Center in Orlando to help get ACT training into naval aviation.

Still, it was the work on human-factors councils (HFCs) that has had the most profound influence on helping aviators realize the impact of human factors in aviation safety. In a December 1989 aeromedical newsletter from the Naval Safety Center, Dr. Alkov reviewed several case studies of individuals he believed could be referred to as "classical high-risk aviators." Besides identifying high-risk aviators, he outlined the essential components of an HFC.

An updated version of Dr. Alkov's HFC outline follows. This outline suggests that HFCs should cover such issues as performance history, mental attitude, and symptoms to look for.

When reviewing an individual's performance history, realize that the most recent performance in his or her aircraft should be the focus. However, the HFC might use past performance to look for trends. Has the individual always had problems with a particular mission? Was the individual a poor performer in flight school? When patterns do emerge, it will be up to the HFC to identify a strategy to get the aviator back up and flying the right way.

Human-factors councils also should consider the experience of an individual when trying to determine

HFC Outline

Performance History
- A. TRACOM grades (if available)
- B. FRS grades
- C. Current squadron CO's comments – Fitness reports

Proficiency (Including hours and landing day/night; instrument time; specific missions, i.e., NVG, ACM, etc.)
- A. Last 30 days
- B. Last 60 days
- C. Last 90 days

Fatigue
- A. Environmental condition
  - 1. On the job - physical
    - a. Noise
    - b. Temperature extremes
    - c. Humidity extremes
    - d. Vibration, heavy seas, etc.
  - 2. On the job - psychological
    - a. Promotion/changing responsibilities
    - b. Changing work hours
    - c. New supervisor
    - d. Learning new job/taking on additional duties
    - e. Passed over/failure to augment
    - f. Getting out of service
  - 3. At home
    - a. Illness or death in family.
    - b. New baby or pregnant wife
    - c. Recent addition to household (i.e., relatives)
    - d. Marital problems/separation/divorce
- B. Crew rest
  - 1. Sleep loss due to:
    - a. Stresses encountered (see above)
    - b. Disruption in diurnal cycle
    - c. Circadian rhythm de-synchrony
    - d. Ops tempo/extended crew day
- C. Missed meals

Symptoms To Look For
- A. Failure at stress coping
  - 1. Increased alcohol intake
  - 2. Recent change of personality
  - 3. Trouble in interpersonal relationships
  - 4. Moving traffic violations
  - 5. Mishaps
- B. Fatigue (symptoms may be subtle)
  - 1. Increased irritability
  - 2. Lapses in judgment
  - 3. Late meeting deadlines
  - 4. Paperwork pilling up
  - 5. Getting behind the aircraft
  - 6. Distracted/preoccupied

Experience
- A. Total flight hours
- B. Time in type
- C. Squadron tours

Physical Condition
- A. Illness history
- B. Medication history
- C. Exercise history (adequate, inadequate, excessive)
- D. Weight/dietary problems

Mental Attitude
- A. Motivation
  - 1. Toward Navy/Marine Corps
  - 2. Toward aviation
  - 3. Toward squadron/unit
  - 4. Toward mission
- B. Hazardous attitudes
  - 1. Denial
  - 2. Impulsivity
  - 3. Macho
  - 4. Anti-authority
  - 5. Resignation

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if someone is at risk. While every aviator was the junior nugget at one point in their career, junior pilots who do not show the gradual improvement that is expected to come with experience should be monitored. Junior pilots who continue to struggle as they gain experience always should be paired with the most effective instructors in the squadron. While there will be a number of good sticks hanging around the ready room, not all of these individuals necessarily are good teachers. Pair the young nuggets with the best instructors, and hope the flying skills start to click.

Aviators treat fatigue like a badge of honor. However, we are learning more about its effects on aircrew. Unfortunately, the latest research points to the profound effects fatigue has on advanced cognitive functioning, such as an individual's ability to make good decisions. Therefore, when addressing fatigue, the HFC should not only consider the operational tempo within the squadron, but also the effects from a busy home life.

What makes an individual tick? This type of question should be asked by an HFC when trying to determine the motivations of an individual. While every aviator is going to have different motivations, the HFC must ask whether those motivations will translate into safe flight. If the individual's motivations are somehow platonic, then the HFC needs to develop a strategy to get that aviator back on the same team.

Finally, Dr. Alkov provided a list of symptoms to look for when discussing an individual during an HFC. Many of the symptoms that identify an at-risk aviator center on the individual's ability to deal with stress. For example, has the individual shown a sudden increased in alcohol intake or trouble in interpersonal relationships? Not surprisingly, Dr. Alkov found a much higher incidence of difficulty in dealing with stress in individuals who had been involved in a mishap.

While there never will be a perfect formula for exactly how an HFC should be run, the table we've provided gives a very general framework for assisting the aviation safety officer in identifying at-risk aviators. Remember, each individual is different, but a few simple guidelines can be followed to make sure everyone in your squadron keeps flying safely.

Cdr. (Ret.) Little and Lt. Walker are with the School of Aviation Safety, Pensacola, Fla.

Hawking Radalt

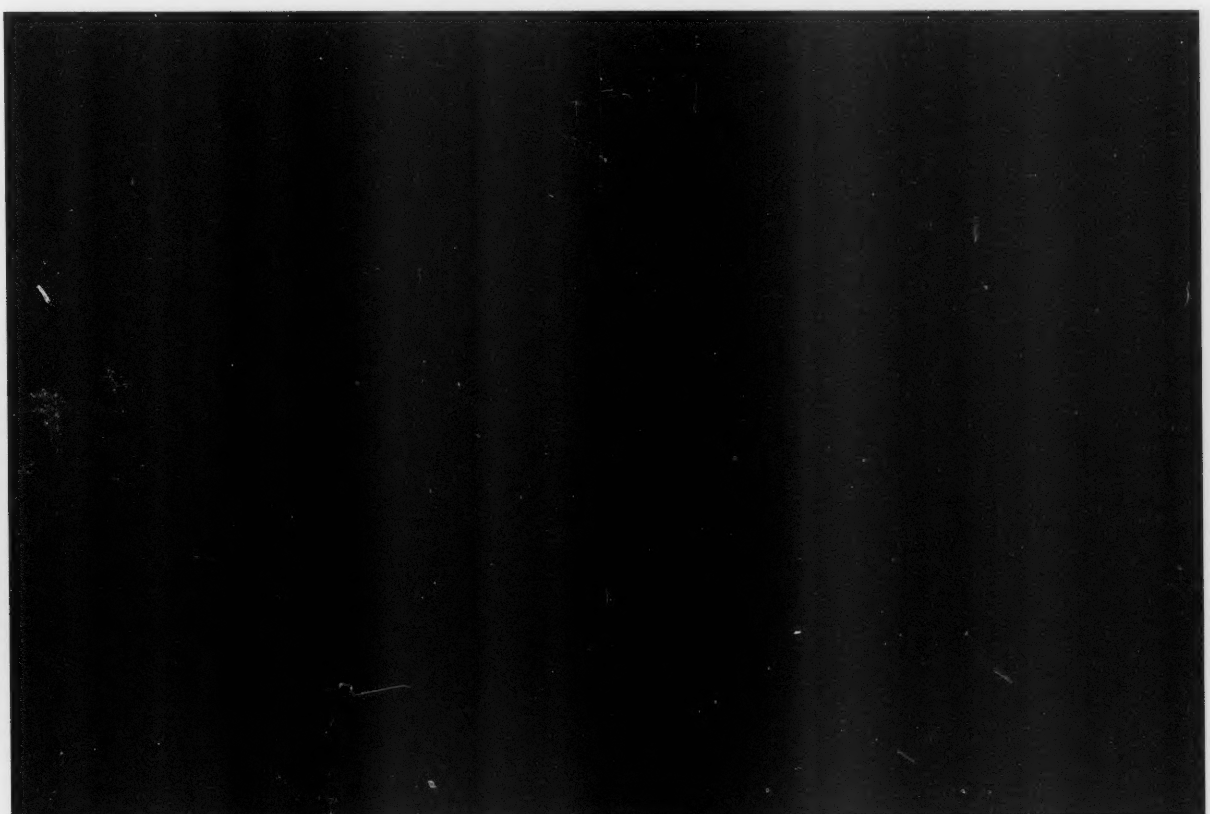
By Lt. Dave Oechslein

Our E-2C crew was scheduled to fly a night unit-level-training (ULT) flight, while deployed in the Gulf of Oman in support of Operation Enduring Freedom. These flights are scheduled every other night, primarily to meet pilot night-currency requirements.

On this flight, we also had the air-wing flight surgeon. Squadron SOP requires guest aircrew to sit in the combat-information-center-officer (CICO) seat, which is the middle seat in the back of the aircraft. A qualified aircrew member must sit in the air-control-officer (ACO) and radar-officer (RO) seats (rear and forward seats respectively) for safety-of-flight reasons, such as firefighting.

We launched from the aircraft carrier with a full bag of gas. Our aircraft had been a backup for the ATO-mission aircraft, and the flight deck had been unable to defuel us before our scheduled launch. We spent the next 40 minutes giving the flight surgeon a Hawkeye familiarization flight. I was flying in the left seat, and the carrier-aircraft-plane commander (CAPC) was my copilot in the right seat. The mission commander was in the RO seat, and a qualified squadron NFO was in the ACO seat.

At the appropriate time, we headed back to the ship to make the evening ready-deck recovery. Marshal gave



us a push time that was a little tight for our distance from the ship, so I made best speed inbound, planning to hit the marshal point and start the approach on arrival. The CAPC ran the approach checklist, and we turned on the fuel-dump switch as we commenced the approach. We needed to dump almost 5,000 pounds to get below max-trap weight.

The Hawkeye dumps about 1,000 pounds per minute during straight and level flight, but the rate slows considerably during the penetration approach because of the nose-down attitude. The CAPC and I were concerned with the fuel weight, so I paid more attention to it than normal. At 5,000 feet (platform), I decreased my rate of descent per CV NATOPS and turned the radalt down to 20 feet.

The radalt is located in the lower left corner of the pilot's instrument panel. The altitude-warning indication is a bright yellow light on the gauge, with no audible side tones, and it remains on until the altitude bug is reset, or the aircraft climbs above the selected altitude. The light has no night setting and is so bright it disrupts night vision. The light also distracts pilots during the most critical phase of the recovery, especially while keeping an effective inside-outside scan to transition from flying instruments to flying the ball.

This poor design has led many in the Hawkeye community to adopt poor radalt discipline, with respect to stepping it down at intermediate altitudes. Many pilots simply set it for an altitude low enough to guarantee it will not come on during the final approach and landing. Squadron SOP requires the radalt to be set at 5,000 feet for platform, after which it is recommended to be set for all intermediate step-down altitudes; actual use below platform is at the pilot's discretion.

While on the descent and still hawking the fuel, the CAPC called out, "Altitude." I saw we were at 900 feet, with a 2,000-foot-per-minute rate of descent. CV NATOPS calls for a 2,000-foot-per-min descent down to 1,200 feet. I immediately climbed to 1,200 feet, and leveled off. We continued the approach and landed.

At the time, I immediately was shaken by the near severity of the situation. I had let my scan deteriorate and had broken the "minute to live" rule. However, it helped me refocus and speed up my scan, which had fallen behind from monitoring the fuel state. After sitting down to replay the events, I identified the following causal factors and what could have been done to avoid them.

First, I should have been more directive in the cockpit and delegated the fuel-dump responsibilities to the CAPC. Both of us didn't need to hawk the fuel at that critical point of the approach.

Second, I should not have allowed myself to fall into the complacency trap with my radalt discipline. From the early days of flight school, pilots are taught to step the radalt up and down at each level-off altitude. Instructors preached that this procedure one day would save all of us from a mistake or worse. Over time, I had come to think the poor design made the radalt more of a nuisance than an asset. In this situation, the radalt would have prevented me from descending through my assigned altitude.

FINALLY, I REALIZED THE ENTIRE AIRCREW had neglected one CRM aspect, with respect to flying the flight surgeon. During the crew brief, we had discussed some of the more obvious aspects of flying a guest, such as his unfamiliarity with the flight deck, ditch and bailout procedures, hot refueling, and crew-switch procedures. The one aspect we had not briefed was the flight backup from the NFOs. Typically, it is the CICO's job to back up the pilots on altitude, airspeed and position during the CV approach. These instruments are located at the CICO station only, and with the flight surgeon in the CICO seat, we had no experienced aircrew in a position to see them.

All of these factors lined up to create the classic "Swiss cheese model" for a mishap, and we were fortunate to have corrected the situation as quickly as we did. It's important for all aviators to create good habits, such as strong radalt discipline, to back you up.

Lt. Oechslein flies with VAW-113.

BRAVO Zulu

Left to right: Lt. Alan Carlson, Lt. Christopher Pratt, LCdr. Tony Rodgers, Lt. Jeffrey Pinkerton.

LTJG. JEFFREY PINKERTON, a freshly minted EA-6B pilot, was returning to NAS Whidbey Island after his first flight with VAQ-140. The rest of the crew, LCdr. Tony Rodgers, Lt. Alan Carlson, and Lt. Christopher Pratt, were getting "back in the saddle" flights after a postdeployment leave period. After the local training flight, the crew did a simulated single-engine approach for crew proficiency.

After the touch-and-go, Lt. Pratt noticed the drop tank on the left inboard wing station was canted up, indicating at least a partial failure of the bomb rack. He called the rest of the crew's attention to the issue. LCdr. Rodgers coordinated with Whidbey tower to proceed to Smith Island (an uninhabited island in Puget Sound, eight miles west of the field) to troubleshoot.

Executing the NATOPS damaged-aircraft checklist, Ltjg. Pinkerton reported the aircraft was controllable in the landing configuration at the appropriate approach speed. As they discussed an emergency explicitly not addressed in NATOPS, the crew decided that because they couldn't be sure the drop tank would not hit the aircraft or adjacent jamming pod, they would retain the store. They also decided an arrested landing might be too violent and pose a risk of further damage.

Ltjg. Pinkerton made a precautionary straight-in approach to runway 14, landing with a minimum rate of descent. The aircraft was met by emergency and squadron maintenance personnel, who safed the stores and pinned the gear before shutdown.

The aft-suspension hook of the AERO-7 bomb rack had failed to open, causing the empty drop tank to partly separate from the aircraft, pivoting on the forward suspension hook. The drop tank had only superficial damage, and the bomb rack's forward suspension hook was marred. The aircraft and the adjacent ALQ-99 jamming pod had no damage.

THE CREW OF EG-01, Maj. Larry Brown (TAC), Capt. Will Oles (T2P), Cpl. John Ward (crew chief), and Cpl. Michael Remmington (aerial observer) were conducting vertical onboard delivery (VOD) to and from USS Bataan (LHD-5) in the Red Sea. During the 60-degree nacelle short takeoff (60 STO) and after Vr from Aqaba King Hussein International Airport as Dash 3 in a light division, they had a shaft-driven-compressor failure (SDC FAIL).

Maj. Brown continued the transition to airplane mode/climb out. He then announced the SDC FAIL and the need to land as soon as possible to the MV-22B crew in tactical lead on intraflight common frequency. Maj. Brett Hart was the section leader under training on the other aircraft, call sign EG-10. Maj. Brown removed his oxygen mask because of the OBOGS failure associated with the SDC FAIL. Capt. Oles raised the landing-gear handle, performed the

Left to right. Cpl. Michael Remington, Capt. Will Oles, Maj. Larry Brown, Cpl. John Ward. Photo by Capt. Andrew Bankston.

after-takeoff checklist, and acknowledged the master alert for the SDC FAIL to the flight crew. Capt. Oles switched the ECS emergency vent, and Cpl. Ward reviewed the NATOPS procedure for the flight crew.

Maj. Hart told control tower of Dash 3's malfunction. He maneuvered the division to enter a right-hand, 170-knot downwind for runway 01, while avoiding the 5,200-foot mountains to the east of the airport. On downwind for the runway, Maj. Carl Forsling (division leader, call sign EG-07) announced to flight of three that lead and Dash 2 would extend off the 180-degree position to allow the Dash 3 to be cleared first to land. Maj. Hart told control tower the first two MV-22Bs were extending, and the aircraft with the failure would be landing first. At the 180-degree position, Maj. Brown initiated the conversion to VTOL mode and, at 130 knots, called for gear down and the landing checklist. Capt. Oles completed the landing checklist and told control tower that EG-01 was abeam, with the landing gear down and locked.

Control tower cleared EG-01 to land, and the crew completed a 75-degree nacelle, 100-knot, roll-on landing (ROL) to runway 01. The crews of EG-01, 10, and 07 displayed strong CRM and disciplined flight leadership.

What's the Origin of "Bravo Zulu?"

For years, *Approach* has run a column called "Bravo Zulu," a collection of short narratives telling about times when aviators did something right. This feature, we feel, balances the rest of the magazine, which consists of just the opposite: aviators talking about errors, miscues, screw-ups and near-disasters. Every once in a while, someone asks about the origin of the term.

It originated as a naval signal, conveyed by flag hoist or voice radio, meaning "well done." It eventually passed into the spoken and written vocabulary, attracting some myths and legends along the way. The one most frequently heard has Admiral Halsey sending it to ships of Task Force 38 during World War II. However, he could not have done this, since the signal did not exist at that time.

"Bravo Zulu" actually comes from the Allied Naval Signal Book (ACP 175 series), an international naval signal code adopted in 1949 after the creation of NATO. Until then, each navy had used its own signal code and operational manuals. World War II experience had shown that it was difficult, or even impossible, for ships of different navies to operate together unless they could readily communicate, and ACP 175 was designed to remedy this.

In the U.S. Navy signal code, used before ACP 175, "well done" was signaled as TVG, or "Tare Victor George" in the U.S. phonetic alphabet of that time. ACP 175 was organized in the general manner of other signal books, that is, starting with 1-flag signals, then 2-flag and so on. The 2-flag signals were organized by general subject, starting with AA, AB, AC, ... AZ, BA, BB, BC, ... BZ, and so on. The B- signals were called "Administrative" signals, and dealt with miscellaneous matters of administration and housekeeping. The last signal on the "Administrative" page was BZ, standing for "well done."

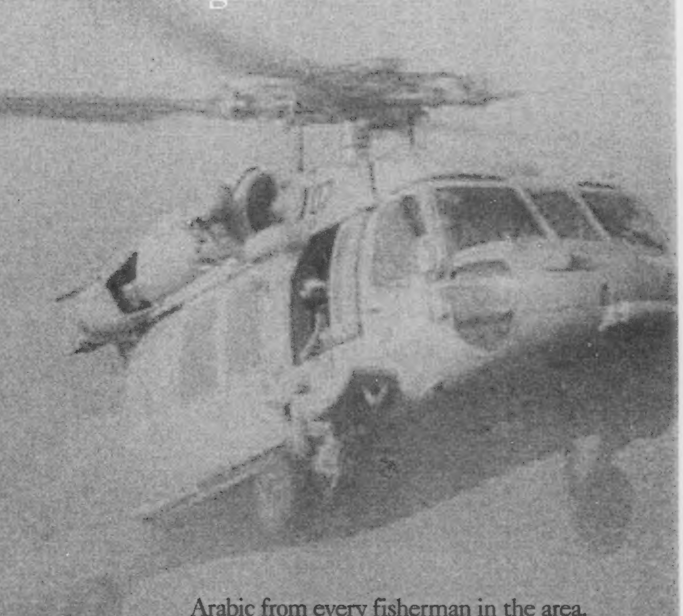
At that time BZ was not rendered as "Bravo Zulu," but in each navy's particular phonetic alphabet. In the U.S. Navy, BZ was spoken as "Baker Zebra." In the meanwhile, the International Civil Aviation Organization (ICAO) had adopted English as the international air traffic control language. They developed a phonetic alphabet for international aviation use, designed to be as "pronounceable" as possible by flyers and traffic controllers speaking many different languages. This was the "Alfa, Bravo, Charlie, Delta..." alphabet used today. The Navy adopted this ICAO alphabet in March 1956. It was then that "Baker Zebra" finally became "Bravo Zulu."

— Courtesy, Naval Historical Center

Not Just the Subject of Another Article to Me... Anymore

By Lt. Brett Johnson

I have read about it a hundred times since getting my wings. It's in every professional aviation magazine we get at the squadron. It never had happened to me, so I really never understood. Now I pay more attention and have learned a valuable lesson that I never will forget.



I was three months into my first deployment, stationed in Bahrain, and flying logistics flights for HSC-26 Detachment One, the "World Famous Desert Hawks." The majority of our flights consisted of four-to-five-hour missions to the Northern Arabian Gulf, carrying passengers, mail and cargo. This day was different, however. While not a glamorous mission, my crew was tasked with diver support for a small patrol craft (PC) in the Central Arabian Gulf. We were to be on station for roughly two hours, holding overhead in case their diver needed to be rushed to a hyperbaric chamber.

We briefed for a standard flight and standard Gulf day, to include inadvertent IMC, and search and rescue in the unlikely event we'd have to take a diver to the chamber. We launched on time, the weather was good, and the forecast projections were expected to remain the same throughout the flight. Once on station, we established communications with the patrol craft. Because we were transmitting on maritime channel 69, each transmission between the PC and our helicopter attracted a flurry of Arabic from every fisherman in the area. While sort of amusing at first, an hour and a half of this chatter became a big distraction.

With about one hour remaining on the diver-support mission, we received a call on base frequency from another aircraft in our detachment. They just had taken off from Bahrain and called to tell us the weather there quickly was deteriorating because of a large sandstorm approaching from the north. After a short discussion with them, we decided to climb and call base for a more in-depth weather report. We climbed to 1,000 feet and encountered moderate turbulence—moderate in that it just was irritating enough to make it impossible to

after-takeoff checklist, and acknowledged the master alert for the SDC FAIL to the flight crew. Capt. Oles switched the ECS emergency vent, and Cpl. Ward reviewed the NATOPS procedure for the flight crew.

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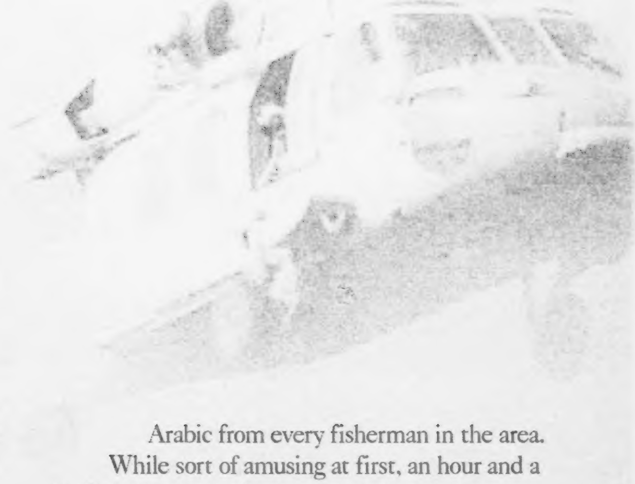
By Lt. Brett Johnson



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maintain our airspeed or altitude. However, while at that altitude, we had better communication with the second aircraft as they relayed the current weather from base. The weather had deteriorated below ILS minimums, and they were working to get us a ship to land on, to get fuel, and possibly to wait out the storm.

Our aircraft had one-and-a-half hours of fuel remaining, and we were 60 miles from Bahrain International. Our base arranged a ready deck within 20 minutes. The other detachment aircraft, en route to its destination, told us they had contacted the ship and relayed our situation. This was good news, and we briefed our new plan. We had 10 minutes left on station for diver support, then we'd fly to the ship, land, refuel, and reassess the weather at Bahrain. If the unsettling conditions continued, we would plan for a short stay on board.

Once we were released from our SAR duties at the PC, we flew north toward the last known position of the waiting ship. We could communicate with the ship over guard frequency, and at roughly 20 miles out, we received the ship's TACAN signal. I was at the controls, flying at 500 feet and 120 knots. My scan went from outside, with no visible horizon, to my instruments and back, in standard fashion. The weather was degrading; the typical white cloudy haze of the Gulf had turned into a bright orange—about the color of sand. At 500 feet, the visibility was decreasing, and it was difficult to see the water. I descended to 300 feet. This altitude was better for about two minutes, but once again, visibility began to decrease. At 17 miles from the ship, I rapidly lost contact with the water. I remember thinking, "I'm about to go inadvertent IMC."

I called out my intentions and began a left turn for 180 degrees to "get out the same way I got in." My scan went from my instruments to outside the left window, to keep visual contact with the ground. However, we were now IMC, and anyone who has been through API knows that in these conditions, if you are not paying full attention to your instruments, bad things can happen. Your mind and eyes will play tricks on you.

After roughly 90 degrees of turn, I heard a call from the aircrewman requesting our airspeed. I focused directly on my airspeed indicator and nothing else. I saw it rapidly decrease through 30 knots when I felt the aircraft commander take the controls. I was frozen in my seat. I sat back and told myself that I must have vertigo. I looked at the attitude indicator, and to my disbelief, we were 30 degrees nose high, with a left turn that quickly was being returned to level. The aircrewman quickly called for radalt. I pushed the button and noted it was holding; we were level. The aircraft commander did an unusual attitude recovery. We recovered at no lower than 200 feet and continued the turn to get out of the sandstorm.

I couldn't believe what had happened; my mind had played a trick on me. At no point did I realize the aircraft was nose high until the control change was made, and I "opened" my eyes. I also couldn't believe our new predicament. There was no way we could maintain VMC and make it to the ship. We were out of the sandstorm and headed south, back toward Bahrain, where the weather conditions quickly were deteriorating. We passed our intentions to the waiting ship and remained on their frequency just in case our plan again needed to change. We set our sights on shooting the ILS back into Bahrain International.

After talking to Bahrain Approach, we learned a commercial jet just had landed and reported he broke out at around 200 feet with roughly 600 meters of runway visibility. These conditions were just enough for us to attempt an approach. After briefing the approach and tuning all the necessary frequencies, I sat back and hawked the instruments. I called out any deviations and tried to be the best copilot I could. The aircraft commander shot an impeccable approach, considering the 45-knot crosswind we faced, along with the terrible conditions. We broke out right over the numbers.

After landing, I was angry with myself for unintentionally putting the aircraft and crew in a bad situation. However, the anger later turned into a learning experience for me. Like I said, we've all read and learned ad nauseam about vertigo. After experiencing it once, I can tell you without a doubt: It is something I never again want to experience.

As pilots, we brief inadvertent IMC every time we fly. "Flying pilot will assume an instrument scan," is one of the mantras I'm sure we've all said, but it now has more meaning for me. Trying to maintain a VFR scan in quickly deteriorating weather has caused many aviation mishaps, particularly for aircraft operating at low altitudes. It can be hard to determine when to actually establish an instrument scan, but I do know that too early is better than too late. Once you're on those instruments, stay on them until you've regained VMC.

Lt. Johnson flies with HSC-26.

A Thousand Words

By LCdr. Dewey Lopes

On Feb. 2, 2009, two VFA-87 Hornets launched from USS Theodore Roosevelt (CVN-71), stationed in the Gulf of Oman. The flight was an on-call, close-air-support (CAS) mission in Operation Enduring Freedom (OEF). The aircraft never arrived on-station. Just 13 minutes after takeoff, the two FA-18A+ aircraft collided in midair and aborted their mission. Almost an hour later, both aircraft recovered aboard the carrier. How did this happen?

BACKGROUND

I am LCdr. "RC" Lopes. I have been on active duty for more than 10 years and have been a winged naval aviator for more than eight years. At the time of this mishap, I had more than 2,300 hours of flight time, of which 1,784 hours were in the FA-18. I had 450 carrier-arrested landings. My qualifications included airborne-interdiction mission commander (AIMC), CVW-8 strike leader, strike-fighter-tactics instructor (SFTI), strike-fighter weapons and tactics (SFWT) level IV instructor, NATOPS instructor, instrument instructor, night-vision device high-flight instructor, CRM facilitator, wing-qualified LSO, and functional-check-flight pilot. I had every qualification a fleet Hornet pilot could attain. I was the mission commander, instructor, and pilot in command for this mishap flight.

OPNAVINST3710

My responsibilities during this flight were clear per OPNAVINST3710: "The mission commander shall be responsible for all phases of the assigned mission, except those aspects of safety of flight that are related to the physical control of the aircraft and fall within the prerogatives of the pilot in command." I also had to make sure the brief and flight were conducted in a safe, professional and efficient manner. I failed to do so.

"The instructor will be charged with authority and responsibility to provide appropriate direction to students (naval aviator or NFO) to ensure safe and successful completion of each training mission." Despite the fact that the mishap flight was an operational mission, the assigned flight lead was acting as a flight-lead-under-instruction. I was the instructor and responsible not only for providing direction to my student but also with providing the voice of reason to make sure the entire evolution was executed in a safe and professional manner. I failed to do so.

"The pilot in command (PIC) is responsible for the safe, orderly flight of the aircraft and well-being of the crew." In a single-seat community, we obviously do not have other crew within our aircraft. We do, however, have other aircrew in our element. I was responsible for the safe operation of my aircraft, as well as the safety of my wingman. I failed to do so.

How does a seasoned, experienced pilot, with every possible qualification, fail so miserably in his duties as mission commander, instructor, and PIC? The old "Swiss cheese" model is a useful way to think about

the events leading to this mishap. As you continue with this article, you'll find many holes in the Swiss cheese, and you'll see how they lined up to allow this needless mishap to occur.

THE BRIEF

All of our OEF mission briefs were given in two parts. First, an overall coordination brief included all players intending to launch on the event. The goal was for each element to have an idea of what the other elements would be doing. After the mass brief, everyone broke down into their own elements for more detailed individual briefs.

I conducted the overall coordination brief, which lasted 15 minutes. We were the last event of the day, and would launch one section of strike fighters and one E-2. We had no assigned joint-tactical-air request (JTAR), only on-call, close-air support (CAS). This meant we would take off, fly an hour to Afghanistan, remain on station for an hour in case we were needed, and then fly home. We were five months into our seven-month combat cruise, and this specific tasking affectionately had become nicknamed "The Afghanistan AIRNAV."

During the brief, I focused on the big picture and covered things like CAG's guidance, theater special instructions (SPINS), and launch-recovery times. I discussed basic routing to and from Afghanistan, as well as assigned tanker times and tracks. When it came to operational risk management (ORM), I highlighted that, for many folks, this would be their first OEF mission after our recent port call. I recommended briefing those implications more specifically in the element briefs.

The flight-lead-under-instruction conducted our element brief, which lasted 15 to 20 minutes. We discussed standard carrier-operating procedures, as they related to fixed-wing launches and recoveries. We discussed our fence-check procedures (how we prepare the jet airborne for combat operations), as well as our go and no-go criteria. Tactically, we rehashed the big picture, as covered in the mass brief. From an ORM and CRM perspective, we discussed in detail that this was our first OEF mission since our last port call. We specifically applied this in terms of fighting complacency during the high-risk portions of our flight: takeoff

and landing, tanking, flexible CAS tasking, and weapons employment. We stressed strict procedural compliance and wingman redundancy to manage risk in these specific areas. We did not, however, discuss how complacency would affect us during the low-stress periods of our flight, such as the hour-long transits to and from Afghanistan, when, traditionally, our guard would be relaxed in anticipation of our mission.

After both briefs were complete, we spent another 20 to 30 minutes in the ready room. This was the first time we discussed the use of cameras during the flight. We talked about how flight lead would be carrying his new digital SLR camera and I would be using a hands-free video camera. We talked about using the SLR for still photographs of opportunity and using the hands-free video camera for low-light video around the tanker near sunset. At no point did we discuss our squadron standing guidance for inflight photography. We didn't discuss specific formation procedures or, more importantly, any photography-specific ORM measures. Furthermore, we did not talk about resisting the urge to show off for the camera.

THE FLIGHT

We read the books in maintenance, dressed in the PR shop, and walked onto the flight deck just like any other flight. We each did some troubleshooting and still were spotted for launch with 15 minutes to spare. We made a covey launch and joined up, heading to the first point on our route to Afghanistan. We completed our admin and tac-admin procedures, and then notified the ship we were heading on our mission.

Once established northbound, flight lead asked me to pull into parade position so he could take pictures. I pulled into a slightly acute parade position, while the flight lead snapped a few pictures. I saw him put down the camera and subsequently moved out toward a tac-wing formation. Then came 20 seconds that I wish I could do over. I made a bad decision and then poorly executed it—two things that, when combined, rarely end with good results.

I asked flight lead to take a few pictures of me coming up over the top. I saw him pick up the camera, and then from about .2 to .3 miles away, tried to do a canopy roll over my flight lead's aircraft. About halfway through the maneuver, I realized it was not going as intended. The two aircraft entirely were too close, and it appeared we might collide. I did my best to avoid the collision, but the wheels already had been set in motion. From an inverted position, I watched as my left wingtip hit the left wing of my flight lead. What on earth had I been thinking?

The obvious answer is that I was not thinking. I thought it would have made a good picture for our cruise book. The weather was nice, we were headed northbound, and I had allowed the transit portion of our flight to become routine. I made a terrible decision. We were on month five of our combat cruise, and I felt extremely proficient—at the top of my game. I'd

been back and forth to Afghanistan too many times to count, and the trip had become standard. Granted, I may have been lulled into a sense of complacency, but there is no excuse for poor judgment.

I should have been thinking about a number of things just before that 20 seconds. I should have thought about our brief and how we hadn't adequately discussed inflight photography. I should have thought about our squadron's standing guidance on photography. My flight lead was using the pilot-relief modes per our guidance, but a canopy roll did not fit the bill of a non-dynamic maneuver. From a CRM perspective, not only did I endanger my wingman, but I didn't give him much of an opportunity to speak up. I was the instructor. I was supposed to be the voice of reason, not him. From an ORM perspective, nothing about this photo would have helped us accomplish our mission of supporting the troops on the ground in Afghanistan. I had accepted unnecessary risk.

Any one of those thoughts would have led me to realize that a canopy roll was a bad idea. It was an unbriefed and ill-advised maneuver that I should not have tried. If nothing else, I should have thought about the performance characteristics of the aircraft. A combat-loaded FA-18 at 25,000 feet has vastly different handling qualities than one configured for basic training missions at 5,000 feet. The bottom line is there were several factors I failed to consider, any of which could have helped me make a better decision.

After the collision, our aircraft separated. When I looked over, my flight lead miraculously still was wings level at 25,000 feet. We turned around and headed toward the ship. We coordinated to get a squadron representative on the radio and for an additional squadron aircraft to meet us near the ship for visual inspections. After the inspections, controllability checks, and jettisoning our ordnance, we both got onboard.

WHAT I LEARNED

I am very fortunate. I've heard some folks say we were just six feet from a near-miss that would have been debriefed and covered at an all-pilot meeting (APM). From my perspective, six feet the other way and I could have killed my wingman and myself. I am fortunate to be able to write about this experience and educate others about the mistakes I made, in hopes they won't be repeated.

I learned more than I ever wanted to know about all of the investigations that ensued. As a result of the mishap, we had an aviation-mishap board (AMB), two fleet naval-aviator-evaluation boards (FNAEBs), and a Judge Advocate General's Manual (JAGMAN) command investigation. Though not related to flight leadership, ORM, CRM, or headwork, these investigations all require a great deal of time and effort from a ton of busy folks who have better things to do with their time. As a result of my inattention to detail and poor decision-making, maintainers were fixing planes that shouldn't have been broken, yeomen were routing paperwork that never should have been written, and aviators throughout the air wing were sitting on boards, instead of flying missions in support of OEF. In addition to lost man-hours and flexibility to support OEF, the aircraft sustained $3.3 million in damages.

FINAL THOUGHTS

From the beginning of flight school, we are taught to brief the flight and then fly the brief. In this case, we should have spent extra time properly briefing our inflight photography. Doing so in the structured environment of a brief, rather than the ad-hoc environment of the ready room, might have prevented the holes in the Swiss cheese from aligning. In the brief, we could have talked about our skipper's guidance, photography-specific ORM, and developed a specific plan for events we wanted to capture on film. Sticking to that plan would have helped avoid the mishap. Because we didn't brief the photography, we should have avoided it all together.

When it comes to ORM and CRM, I didn't focus our attention on the parts of the flight where complacency most likely could occur. Realistically, it's difficult to let down your guard on a night carrier landing; landing on the ship is stressful and requires intense concentration. Complacency is most likely to set in during times when the pack is off, and for flights into Afghanistan, the most likely time was on the transit. During the 4.5 to 6.5 hour flights, we consciously relaxed to provide a physical and mental rest. We should have included the low-risk and low-intensity portions of our flight in our brief's ORM and CRM discussions to help move some slices of Swiss cheese. At the very least, we would have better recognized the hazard of letting down our guard during transit.

I hope my story will serve as a reminder the next time someone finds himself/herself standing on the doorstep to making a poor decision. A picture may be worth a thousand words, but no picture is worth the extra work that results from a mishap.

LCdr. Lopes flies with VFA-87.

Roll the Twist Grip

By Lt. Scott Purcell

I was getting ready to take my onwings on their fifth familiarization flight. The weather was clear, visibility unrestricted, and the March temperature in northwest Florida hadn't yet attained that oppressive summertime heat. We enjoyed one of those "I can't believe I get paid to do this" days.

I had been an instructor for less than a year and had transitioned from the TH-57C to the TH-57B about five months earlier. I was on my third set of onwings, so I had been doing simulated emergencies and full autos for the past two months straight. Because it was the first day for this set of students to do simulated engine failures at altitude, we spent time working around "tree field," a plowed field about 2,000 by 2,000 feet. We could land there in case the engine didn't come back online after the maneuver.

I flew my first student to tree field. When I took the controls at 400 feet to execute a waveoff, the engine accelerated a little rougher than normal when I brought the twist grip to the full-open position. We had no other unusual indications, so we continued to NOLF Pace to complete training.

Later, when I got to tree field with my second student, we briefly discussed what to do in the event of an engine failure. I then rolled the twist grip to the "flight idle" position, announcing "simulated" as I did. My student went through the procedure of "down, right, transition, turn," as stated in the FTI, while he tried to get into the proper autorotational profile to make the field for a safe recovery. Unfortunately, his transition involved an abrupt aft-cyclic application. So we slowed below 40 knots before I could correct the nose position and accelerate to the desired 55 to 60 knots. His action took me by surprise, because most students are so tentative on the controls the first time doing any emergency procedure that they barely move them.

I took the controls, brought the engine back online, and conducted the waveoff to the north to remain clear of course rules. I also noticed the same roughness I had heard on the previous flight but didn't give it any more thought. I then discussed the importance of maintaining airspeed during an auto. My student needed to try another engine failure sooner, rather than later, so he could apply what he had learned. As we approached another clear field, this one only about 700 by 200 feet, and surrounded by trees, I once again rolled the twist grip to idle, announcing "simulated."

The setup I gave required him to perform a 180-degree turn, while forcing him to maintain his airspeed and Nr to make the field. I talked him through the maneuver and only had to make small inputs on the controls. His improvement was good to see.

Once again, as my radar altimeter reached 400 feet, I took the controls and rolled the twist grip to the full-open position. This time it didn't just feel a little rough. As I opened the twist grip, the engine accelerated as expected but then immediately dropped back down. All the gauges were low, and the engine sounded like it was modulating, almost like a car if you continually pressed and released the accelerator. I briefly pulled up on the collective and watched all the gauge indications decay. I put the collective full down again to preserve Nr, told my onwing the engine was not back online, and to lock his harness. I then looked down and saw us pass through 250 feet on the radalt, with my VSI at a 1,500-fpm rate of decent. We had the field made, and I completed a full autorotation into a local gentleman's backyard.

Once on deck, I took a moment to make sure we were, in fact, alive. As I silently thanked my student for flying a much better engine-failure profile that time, we completed the shutdown. I called the squadron and explained what I thought had happened. I gave them directions so maintenance could send a truck and trailer to get the helicopter and to bring us back.

ONCE WE RETURNED, we told our maintenance supervisors that, after bringing the engine back on, we had low Ng, Nr and torque, and even after raising the collective, I never saw more than 12-percent torque from the engine. They told me they would look at the aircraft, and as I walked into maintenance control, I could see that "this was all the pilot's fault" look in their eyes.

As I suspected, they came in while I was filling out my paperwork and said they didn't find any initial indications of problems with the aircraft, but they would keep looking.

The next day I was doing simulated engine failures with the same onwing. Everything was fine, other than I began to doubt myself because of the preliminary findings by our maintainers. I wondered, "Did I just auto a perfectly good aircraft into some guy's backyard?"

A few weeks later, our squadron's safety officer updated me what the mechanics had discovered. The fuel nozzle in the engine partly was clogged, which caused an inconsistent spray pattern, preventing the proper fuel delivery to the combustion chamber. This was the source of my problems north of tree field.

In the end, preparation, practice and procedures saved us. Not everyone in the fleet spends their days rolling the twist grip of a single-engine helicopter to idle and back. However, knowing and practicing NATOPS procedures and being prepared for the worst applies to all aviators and will see us through to the next mission.

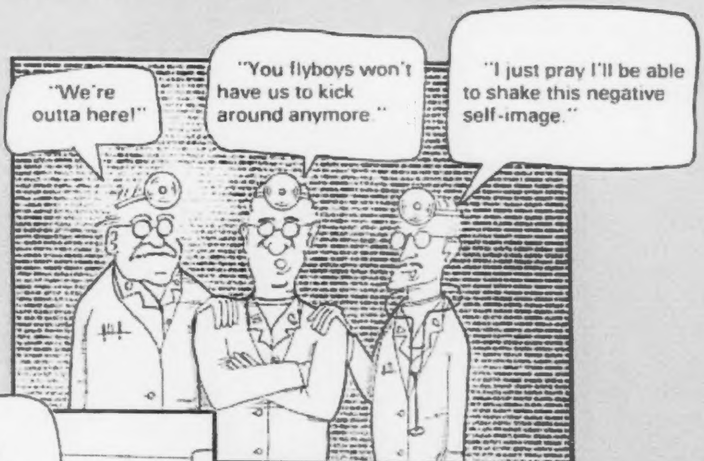
Lt. Purcell flies with HT-28.

BROWNSHOES IN ACTION COMIX

By Lt. Ward Carroll

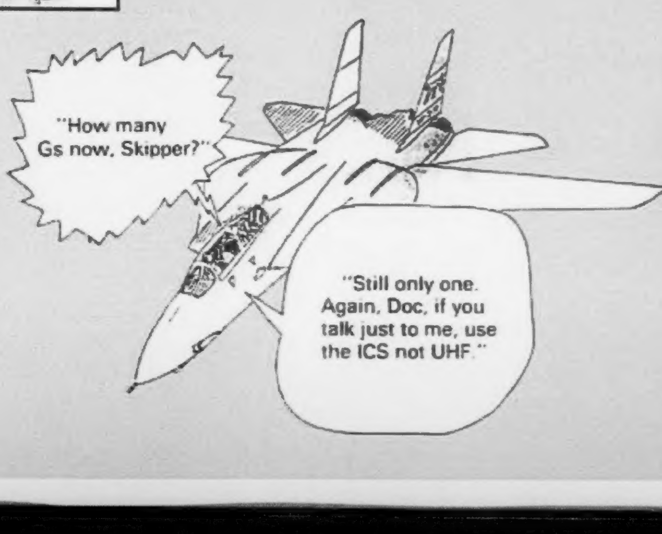
The Day the Docs Walked (almost)

They had reached the end of their surgical tubing . . .



Had there been too much teasing? Aviators were caught off guard. Realizing the need for aerospace medicine, they quickly developed a new streamlined annual flight physical.

Fortunately, the potentially disastrous situation was remedied when skeds writers throughout the fleet put their flight surgeons on the schedule the following day . . .



"I'm not sick, I don't need a doctor."

Think again!